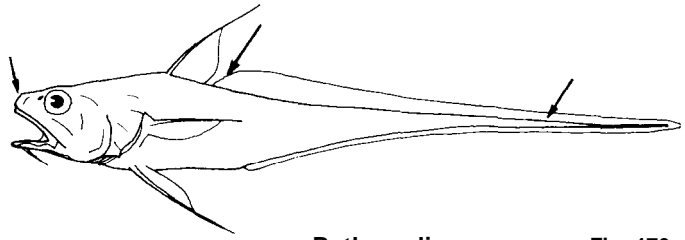
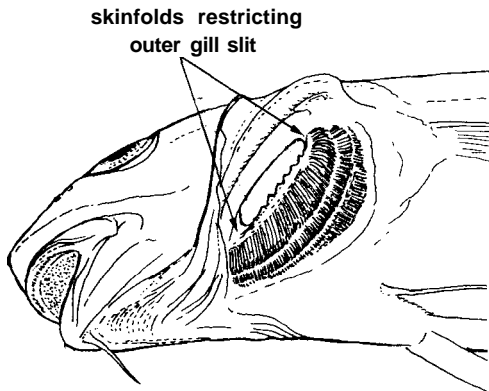


3b. Snout rounded; mouth terminal; body scales unmodified, without spinules. No post-temporal fossa (Fig. 176) ..... **Bathygadinae**

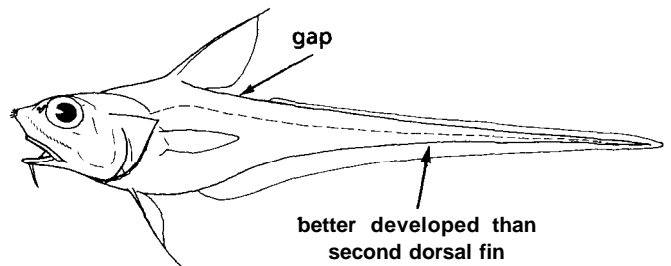
2b. Anal fin better developed than second dorsal; a distinct gap between dorsal fins (Fig. 178). Gill rakers all tubercular (rarely lappet-like) (Fig. 174b). Outer gill slit restricted by folds of skin (Fig 177)..... **Macrourinae**



**Bathygadinae** Fig. 176  
(after Parr, 1946)



ventral lateral view  
**Macrourinae** Fig. 177  
(after Iwamoto, 1970)



**Macrourinae** Fig. 178

2.5.1 **Subfamily BATHYGADINAE**

**Synonyms** : None

**General Features** : Mouth wide, terminal, slightly protractile, premaxillae with short pedicels; small to minute teeth in bands in both jaws; barbel long, reduced, or absent; branchiostegal rays 7; first gill slit unrestricted; gillrakers on first arch long, slender, numerous. Two dorsal fins, the first short, with a slender spinous second ray, the second long, beginning close behind the first, with rays well developed, much better so than those of anal fin, which has rudimentary rays. Abdominal vertebrae 11 to 13. Scales without spinules. Swimbladder with 2 or 4 retia mirabilia; no drumming muscles. Anus immediately before anal fin. No light organs.

**Habitat, Distribution and Biology** : Worldwide in tropical to subtropical seas, but absent in continental slope waters of the eastern Pacific. Species of this subfamily span a considerable depth range, from about 200 m to more than 2 700 m (*Bathygadus favosus*), but most are found between 400 and 1 500 m. Their large terminal mouth with small teeth in bands, numerous slender gill rakers, simple N- or S-shaped intestines, and fin structure suggest a feeding mode somewhat different from most other grenadiers. Stomach contents most often show copepods, euphausiids, and natantian decapod crustaceans, suggesting a preference for free-swimming, off-bottom prey.

**Size** : To more than 60 cm.

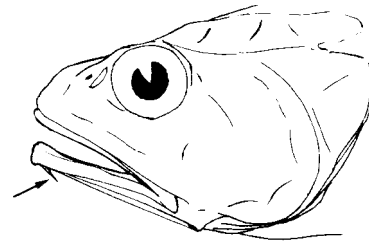
**Interest to Fisheries** : Only *Bathygadus macrops* of the North Atlantic appears to occur in sufficient numbers and in shallow enough depths to be of interest to fisheries. A deeper-living species with a similar geographic distribution, *B. melanobranchus*, is also taken in moderate quantities by deep trawlers.

**Literature** : Okamura (1970a); Marshall (1973).

**Remarks :** Okamura (1970a) and Marshall (1973) have more than adequately characterized this well-marked group of species. The included genera, *Bathygadus* and *Gadomus*, are closely related, but the species appear to fall in nicely with one or the other. Howes (1988, 1989) has removed the group from the suborder Macrouroidei and placed it in the Gadoidei. The present author does not feel that the evidence for such a drastic move is sufficiently compelling to fully support it as yet. It seems wiser to reserve judgement until additional evidence emerges.

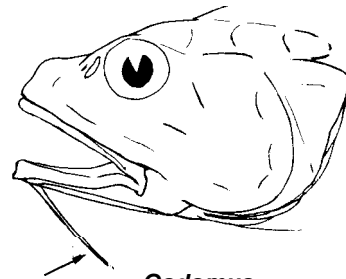
**Key to Genera :**

- 1a. Barbel small (less than 1/3 of orbit) or absent (Fig. 179). Teeth small, but never shagreen-like. Two retia mirabilia in swimbladder ..... *Bathygadus*
- 1b. Barbel long (except in *G. capensis*), usually more than half of orbit diameter (Fig. 180). Teeth small to minute, often shagreen-like. Four retia in swimbladder ..... *Gadomus*



*Bathygadus*

Fig. 179



*Gadomus*

Fig. 180

***Bathygadus* Günther, 1878**

**MACROUR Bath**

**Genus with Reference :** *Bathygadus* Günther, 1878, Ann.Mag.Nat.Hist., ser. 5, 2:23 (type species *Bathygadus cottoides* Günther, 1878 by monotypy).

**Synonyms :** *Melanobranchus* Regan, 1903; *Regania* Jordan & Starks, 1904

**Diagnostic Features :** Interopercle slender, angulate, shaped somewhat like a boomerang, the posterior third directed posteroventrally, the ventral margin concave; olfactory bulbs in contact with forebrain. Chin barbel small or absent. First dorsal and pectoral fins seldom with elongated rays; outer pelvic ray sometimes weakly produced. Retia mirabilia in swimbladder 2.

**Habitat, Distribution and Biology :** Worldwide in tropical to subtropical waters, but not yet reported from the continental slopes of the eastern Pacific. Benthopelagic in about 200 to 1 500 m depth.

**Size :** To about 52 cm total length

**Interest to Fisheries :** So far only 2 species, *Bathygadus macrops* and *B. melanobranchus* are known to be taken incidentally as bycatch of other fisheries.

**Literature :** Gilbert & Hubbs (1916; 1920); Iwamoto (1970); Okamura (1970a); Marshall (1973)

**Remarks :** *Bathygadus filamentosus* has a greatly elongated ray in the first dorsal, pectoral, and pelvic fins, very reminiscent of the fins in *Gadomus longifilis* and *G. multifilis*. The absence of a chin barbel and the boomerang-shaped interopercle, however, place the species in *Bathygadus*. Gilbert & Hubbs (1920:379) provide a key to the 14 species of the genus.

## List of Species :

*Bathygadus antrodes* (Jordan & Gilbert, 1904)  
*Bathygadus bowersi* (Gilbert, 1905)  
*Bathygadus cottoides* Günther, 1878  
*Bathygadus entomelas* Gilbert & Hubbs, 1920  
*Bathygadus favosus* Goode & Bean, 1886  
*Bathygadus filamentosus* (Smith & Radcliffe, 1912)  
*Bathygadus furvescens* Alcock, 1894  
*Bathygadus garretti* Gilbert & Hubbs, 1916  
*Bathygadus macrops* Goode & Bean, 1885  
*Bathygadus melanobranchus* Vaillant, 1888  
*Bathygadus micronemus* (Gilbert, 1905)  
*Bathygadus nipponicus* (Jordan & Gilbert, 1904)  
*Bathygadus spongiceps* Gilbert & Hubbs, 1920  
*Bathygadus sulcatus* (Smith & Radcliffe, 1912)

***Bathygadus macrops* Goode & Bean, 1885**

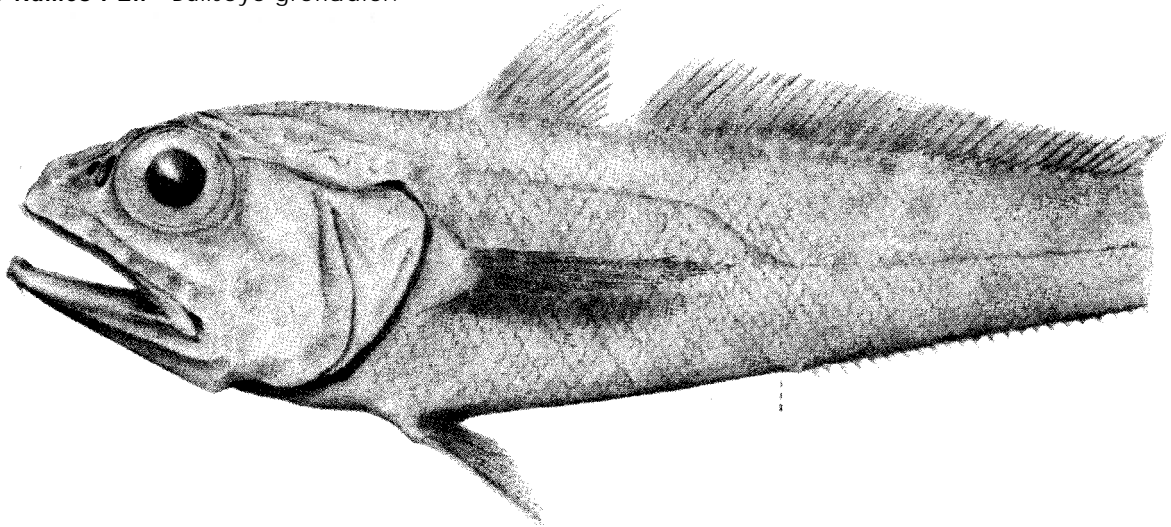
Fig. 181

**MACROUR Bath 1**

**Scientific Name with Reference :** *Bathygadus macrops* Goode & Bean, 1885, Proc.U.S.Natl.Mus., 8:598 (northern Gulf of Mexico, 28° 34'N, 86°48'W; 613 m).

**Synonyms :** *Bathygadus goethemi* Poll, 1953

**FAO Names :** En - Bullseye grenadier.



**Fig. 181**  
(from Iwamoto, 1970)

**Diagnostic Features :** Chin barbel rudimentary; orbits large, 26 to 34% of head length, wider than interorbital space, which is 18 to 27% of head length; head rather firm, not cavernous; outer gill rakers on first arch 6 or 7 + 19 to 22. Integument thick, scale pockets usually well defined. Pelvic fins with 8 rays, outer ray slightly produced; no other prolonged rays in fins. Pyloric caeca 30 to 40.

**Geographical Distribution** : Tropical Atlantic. Known from the US coast (ca. 37°N) and in the Gulf of Mexico and Caribbean in the western Atlantic; from the Gulf of Guinea (Ivory Coast to Angola), in the eastern Atlantic (Fig. 182).

**Habitat and Biology** : Benthopelagic from 200 to 777 m. Recorded depth in the eastern Atlantic about 200 to 733 m, in the western Atlantic 347 to 777 m.

**Size** : To about 50 cm total length.

**Interest to Fisheries** : Captured in moderate numbers in the Gulf of Mexico as a bycatch in the royal red shrimp (*Pleoticus robustus*) fishery; also found in moderate quantities in the Gulf of Guinea, but of no commercial significance there.

**Literature** : Iwamoto (1970); Marshall (1973).

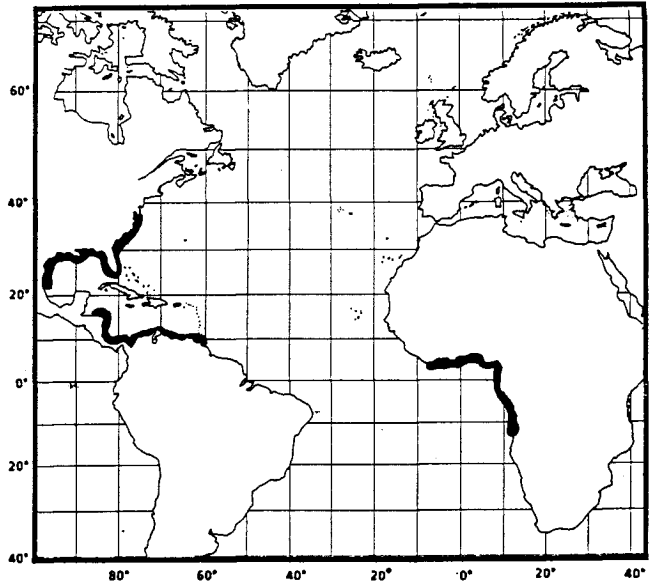


Fig. 182

***Bathygadus melanobranchus* Vaillant, 1888**

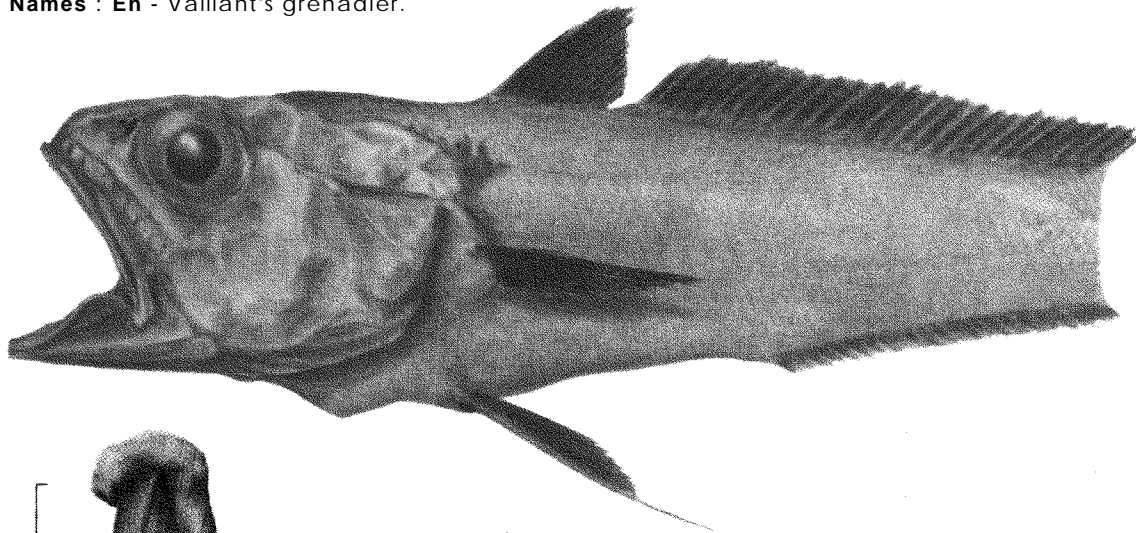
Fig. 183

**MACROUR Bath 2**

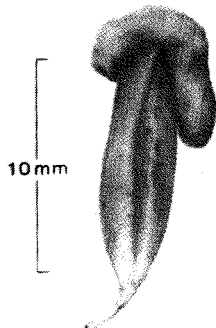
**Scientific Name with Reference** : *Bathygadus melanobranchus* Vaillant, 1888, Exped.Sci.Travailleur et Talisman, Poissons: 206-210, pl. 18, fig. 1 [off Morocco, 32°29'N, 9°47'W; 834 m].

**Synonyms** : *Bathygadus vaillanti* Roule & Angel, 1933

**FAO Names** : En - Vaillant's grenadier.



a.



b. retia mirabilia and gas gland

Fig. 183  
(from Iwamoto, 1970)

**Diagnostic Features** : Head bones and integument fragile, easily torn; orbits large (25 to 30% of head length); interorbital space about equal to orbit diameter, 25 to 30% of head length; chin barbel absent; outer gillrakers on first arch long and slender, 6 or 7 on upper limb and 21 to 24 on lower limb; outer rakers on second arch tubercular, 2 or 3 on upper limb, 18 to 22 on lower limb; teeth villiform, narrow, in wide bands on upper jaw, in a narrow band on lower jaw. First dorsal fin with two spinous and 9 to 11 segmented rays; pectoral fin with 16 to 20 rays; pelvic fin with 8 rays; outer pelvic ray slightly elongated, but no other fin with prolonged rays. Pyloric caeca 25 to 40, their lengths 1/2 to 4/5 diameter of orbit; swimbladder with two stout retia mirabilia ending in globular, connected gas glands (Fig. 183). **Colour** : overall somewhat swarthy to rather pale; fins dark grey to black; linings of mouth, gill, and abdominal cavities black; gill lamellae each with a darkly pigmented median stripe that gives the gill filaments an overall dusky colour.

**Geographical Distribution** : Tropical North Atlantic, most of eastern Atlantic (Ireland to South Africa), and possibly into western Indian Ocean (but these records not verified by author) (Fig. 184).

**Habitat and Biology** : Benthopelagic in about 400 to 1 700 m, but usually taken between 800 and 1 400 m. Merrett and Marshall (1981) found a narrow depth range for the species off North Africa and correspondingly no suggestion of a size-depth relationship. The species was one of the most numerous in their collections and dominated by males. Food items in the stomachs showed a prominence of the mysid *Gnathopausia zoea*, with pelagic copepods and chaetognaths of somewhat lesser importance.

**Size**: To about 40 cm total length.

**Interest to Fisheries** : Captured in small numbers in the Gulf of Mexico with the commercial royal red shrimp (*Pleoticus robustus*), but is not utilized.

**Literature** : Parr (1946); Grey (1956); Iwamoto (1970); Marshall (1973); Merrett & Marshall (1981).

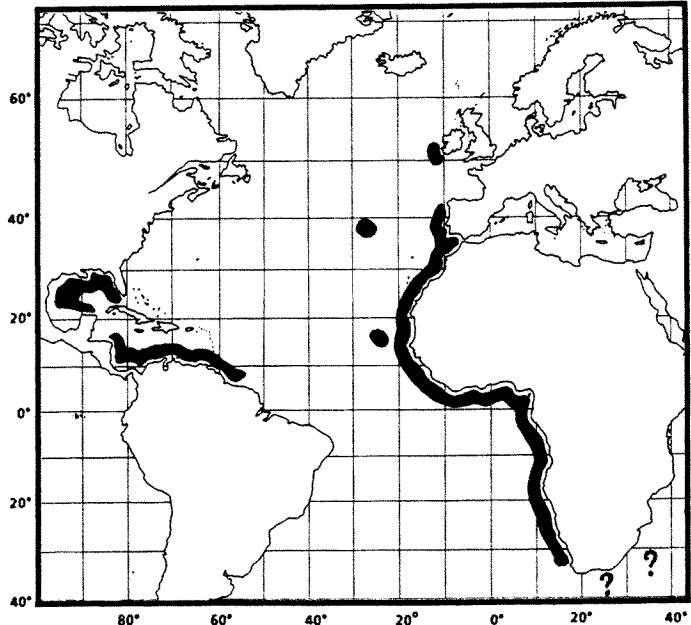


Fig. 184

**Remarks**: The closely related species *B. favosus* is generally found in the same areas as *B. melanobranchus* but at greater depths; it is distinguishable by its darker overall colour, 9 pelvic fin rays, and somewhat broader interorbital space (orbit diameter 1.4 to 2.0 into interorbital space). Reports of captures of *B. melanobranchus* from depths greater than 1 700 m should be considered suspect, as the species can easily be misidentified as the deeper-living *B. favosus* by the uninformed observer.

**Gadomus** Regan, 1903

**MACROUR** Gado

**Genus with Reference** : *Gadomus* Regan, 1903, *Ann. Mag. Nat. Hist.*, ser. 7, 11(65):459 [type species *Bathypagus longifilis* Goode & Bean, 1885, by original designation].

**Diagnostic Features** : Chin barbel well developed; interopercle broad, trapezoid-shaped; its ventral margin never deeply concave, generally following that of preopercle; teeth minute, densely packed in narrow to broad bands on jaws, giving shagreen-like texture; olfactory bulbs forward of brain, between orbits. One or more greatly elongated rays in first dorsal, pectoral or pelvic fins. Retia mirabilia in swimbladder 4.

**Habitat, Distribution and Biology** : Worldwide in tropical to warm-temperate waters, but not over continental margins of the eastern Pacific. Benthopelagic, most living in depths between 400 and 1 100 m.

**Size** : To about 52 cm total length.

**Interest to Fisheries** : Very minor at present, but occasionally taken as bycatch. Three of the most abundant species in this genus are *G. arcuatus* (North Atlantic), *G. capensis* (Southern Africa), and *G. multifilis* (Indian Ocean and South Pacific).

**Literature** : Gilbert & Hubbs (1916, 1920); Iwamoto (1970); Marshall (1973).

**Remarks** : *Gadomus capensis* is the only member of the genus having a chin barbel sometimes shorter than about half the orbit diameter, but it is distinctly longer than the minute ones in *Bathygadus macrops* and *B. sulcatus*. Gilbert & Hubbs (1920:392) provide a key to the species (not including *G. capensis* and *G. aoteanus*).

**List of Species :**

*Gadomus aoteanus* McCann & McKnight, 1980  
*Gadomus arcuatus* (Goode & Bean, 1886)  
*Gadomus capensis* (Gilchrist & von Bonde, 1924)  
*Gadomus colletti* Jordan & Gilbert, 1904  
*Gadomus denticulatus* Gilbert & Hubbs, 1920  
*Gadomus dispar* (Vaillant, 1888)  
*Gadomus introniger* Gilbert & Hubbs, 1920  
*Gadomus longifilis* (Goode & Bean, 1885)  
*Gadomus magnifilis* Gilbert & Hubbs, 1920  
*Gadomus melanopterus* Gilbert, 1905  
*Gadomus multifilis* (Günther, 1887)

***Gadomus arcuatus*** Goode & Bean, 1866

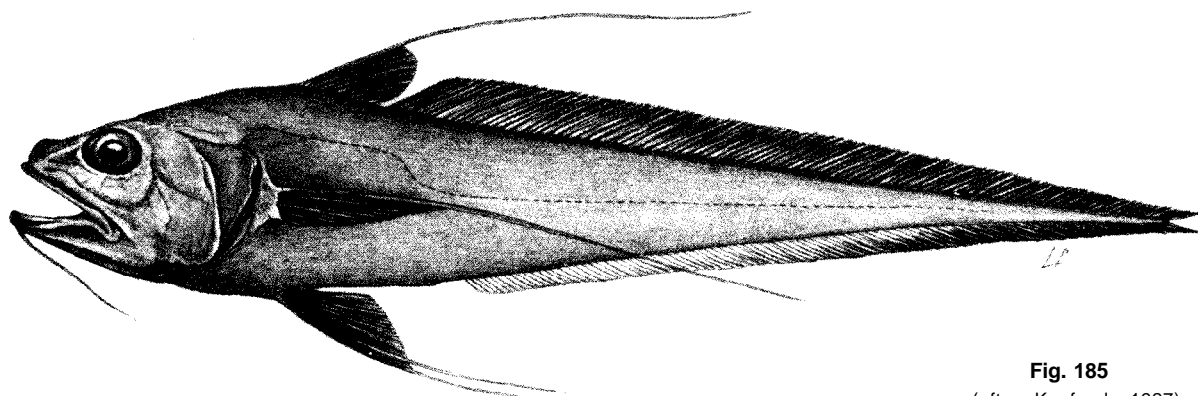
Fig. 185

**MACROUR Gado 1**

**Scientific Name with Reference** : *Bathygadus arcuatus* Goode & Bean, 1886, Bull.Mus.Comp.Zool.Harvard, 12(5):158 [Caribbean Sea off Martinique 14°25'15"N, 60°56'35"W; 607 m; Blake sta. 205, 10 February 18791.

**Synonyms** : *Gadomus arcuatus*, Gilbert & Hubbs, 1920.

**FAO Names** : En - Doublethread grenadier.



**Fig. 185**  
(after Koefoed, 1927)